

Volcanic Dust, the "New Bishop's Ring," and Atmospheric Absorption

DR. ROTCH (vol. lxxviii. p. 623) may, from experience, know whether this phenomenon is more prominent in the United States than in Europe, and better than can be ascertained by simply collating reports of the sky appearances as seen by different observers in the two continents, but he is mistaken in supposing that the phenomena in question have not been mentioned in European journals, as he will find a full description of the "New Bishop's Ring" in your pages (the issue of December 25 last, p. 174), particularly as observed at Sunderland.

As stated there, there was at first a striking difference from the Krakatoa "Bishop's Ring" in dimensions, but while very variable in size, it was afterwards in general reduced to more nearly the size of the Krakatoa circle.

Since the Krakatoa phenomena this circle has rarely been wholly absent about sunrise and sunset, though for some years was faint, so far as my experience goes, until July, 1902. Whether it existed at all before the autumn of 1883 I cannot say, as one's attention was not directed to it until it became conspicuous. On its recrudescence last year it did not become visible at other times than sunrise or sunset, so far as I noticed, until August 1, and it was not until some months later that it became conspicuous in the full day-time. I can reply to the inquiry of M. Forel in your issue of August 27, p. 396, that the circle is now plainly visible, not intermittently, but always, and not only about sunrise and sunset, but in the day-time; and not only at high altitudes, but at the sea-level also. But my experience so far agrees with M. Forel's that I found in a visit to Switzerland last July and August that the higher one ascended the more conspicuous the circle became—up to a certain point at least; I did not ascend higher than 8100 feet.

In answer to Prof. Langley (p. 5) I may say that I have not noticed a single night this year or last winter when the atmosphere appeared to be normally clear, stars at a low altitude having never been clearly seen here. I had also an impression as to the want of clearness during my visit to Switzerland, but I have not yet made calculations on the observations I made for absorption. During the day-time this want of clearness has not been at all observable, the sky outside of "Bishop's Ring" having been very frequently of a beautiful blue. I note that Prof. Langley makes the abnormal absorption increase towards the violet end of the spectrum. This seems at first sight rather contrary to the circumstance that I have occasionally noticed an unusual paleness of the sun when a few degrees off the horizon; indeed, it has sometimes appeared of a slightly greenish yellow, but possibly the relative clearness shown by Prof. Langley's table at μ 0.60 may have some connection with this.

I am surprised that Prof. Langley does not attribute this condition of the atmosphere to the volcanic dust. This would seem to me much the most probable explanation.

T. W. BACKHOUSE.

West Hendon House, Sunderland, November 23.

Action of Radium on Bacteria.

CONTINUING the experiments of one of us on the action of radium bromide on plants, we have experimented on various bacteria. We find that, in the case of *Bacillus pyocyaneus*, *B. typhosus*, *B. prodigiosus*, and *B. anthracis* in agar culture medium the β radiations from radium bromide exercise a marked inhibitory action on growth. Exposure for four days at a distance of 4.5 mm. to 5 mgr. of radium bromide does not appear sufficient to kill the bacteria, but is adequate to arrest their growth and to maintain a patch on an agar plate, inoculated with any of these organisms, sterile. A broth tube, however, inoculated from this patch has in most cases developed the organisms, showing that while the growth is inhibited in the patch all the organisms there are not killed.

HENRY H. DIXON.
J. T. WIGHAM.

Trinity College, Dublin, November 19.

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MEDICAL SCIENCE AND THE ANTI-VIVISECTIONISTS.

THE vindication of law and common sense exhibited by the substantial damages awarded to Dr. Bayliss after a trial occupying the Lord Chief Justice and a special jury for four days must afford the greatest satisfaction to everyone who is aware of the long course of systematic persecution which has pursued all those who devote themselves to the scientific side of medicine, and culminated in an attack by Mr. Coleridge on Dr. Bayliss and Prof. Starling, and on University College where they work.

There are many points of interest in this particular battle between a heavily subsidised society and its victim, to some few of which we may briefly refer—but of greater interest in reality are those aspects of this case which illustrate the immemorial conflict between knowledge and ignorance.

It is amazing that in the twentieth century, when it is at length recognised, even in this country, still lagging far behind its Continental rivals, that throughout the whole field of education practical instruction is of paramount importance, we should see one scientific witness after another pressed to explain why it should be necessary for a proper comprehension of the functions of living bodies to see the parts of those bodies in motion. The most intricate machine in the world is simplicity itself compared to any living body, but who could be trusted to repair a watch, a motor car, or a marine engine who had never seen their mechanism in action? Who would trust his life to a pilot who had never been to sea, to a physician who had never studied by the bedside, or to a surgeon who had never witnessed an operation? Would anyone try to teach a child the scent of a violet out of a book? Yet in this case, so happily and justly decided against Mr. Coleridge and his Society, an eminent counsel has asked again and again why students need concern themselves with any more practical physiology (the foundation of all the knowledge they can acquire) than they can learn from the pages of a book, while to support such a plea pseudo-scientific witnesses living and dead were quoted as deliberately asserting that practical instruction is wholly superfluous.

No single error has done more to hinder the progress of medicine in the past than the common attempt to deduce function from structure without direct experimental verification. Yet in the face of the clearest lessons this fallacious method is continually urged upon us as if its utility was self-evident; of this illustrations could be cited almost without limit. The error of Erasistratus that the arteries did not contain blood, apparently supported by anatomical observation, blocked the road to knowledge for 500 years, and was only dispelled at last by Galen's simple experiment of tying an artery in two places in a living animal and opening the vessel between the ligatures. A late obstetric surgeon, whose mischievous prejudices were received with such faith and quoted with such reverence by the anti-vivisectionists, so little understood the information and arguments of the early anatomists that he imagined they had never seen blood flow from an artery, and would have been convinced of their error if they had done so. Another of his "professional convictions" was that the circulation of the blood could easily have been discovered by anyone with a syringe and a dead body, though he must have known that the syringe and the dead body had been in the hands of anatomists from the time of the Pharaohs at least, and that Malpighi, who discovered the capillary circulation by direct observation of the living frog, had previously been entirely misled by attempts to inject the blood vessels in dead animals. Harvey discovered the circulation of the blood by con-

tinual observation of the motions of the heart and blood vessels in living animals, and this epoch-making discovery is always wrongly attributed by anti-vivisectionists to the observation of the valves of the veins, though it must be clear that in that case they would have suggested to Fabricius, their observer, the real meaning of their presence and structure.

Sir Charles Bell, who has been quoted with wearisome reiteration to disparage experiments on living animals, and to exaggerate the exclusive importance of anatomical investigation, not only contradicted himself, but earned his scientific reputation by those experiments on living animals which he later condemned, and when he adhered strictly to "the just views taken from the study of anatomy" he fell into the greatest error which ever misled an eminent man. Two hundred years after Harvey had settled the question of the circulation of the blood for ever, Sir C. Bell, confusing himself with a syringe and a dead body, and unable to allow for the difference between it and a living one, came to the conclusion that the heart had little to do with the circulation of the blood, and adopted Galen's error that the principal force was the attraction of the vessels for the blood, and maintained that the law of gravity was abolished in living animals, but that Providence re-introduced it temporarily (!) for the arrest of hæmorrhage whenever an animal sustained a trifling wound.

Consistent in whole-hearted devotion to their own views, the anti-vivisectionists have misrepresented the lessons of the past and opposed every step of progress in medical knowledge in our own time. They profess to believe that every stage of progress in medicine has been effected, and always must be, by clinical work alone. Yet it is perfectly obvious that from classical times clinical investigation at Alexandria and Cordova and many other places enjoyed as great opportunities as could be desired, yet, until the opening of the renaissance of experimental method with Harvey about 1400 years later, medical knowledge had scarcely moved, for it is impossible to say that the physicians who mobbed Charles the Second to death, and who presumably represented the best talent of that time in England, and Dr. Guy Patin, Dean of the Faculty of Medicine in Paris, an eminent physician of about the same period, who maintained that all medical knowledge was summed up in senna and the lancet, had more real knowledge of physiology and the meaning of symptoms than Galen. And in modern times, when more progress in the knowledge of the causes and nature of disease has been acquired in a few years than in as many centuries formerly, every step of progress which has been obtained by physical science has been opposed by the anti-vivisectionists. Antiseptic surgery, which has brought more immediate relief from pain and death than any single discovery in the history of the human race, the whole science of bacteriology, with the light which has been thrown on tuberculosis, cholera, diphtheria, yellow fever and malaria, and the mysteries of infection and immunity, improvements in the operations of surgery, and the great names of Pasteur, Koch, and Lister, each and all have been assailed by the anti-vivisectionists with every species of abuse and disparagement.

Indeed, the denials or at best the grudging admission of the advances made in recent years in medicine and surgery would suggest that to the anti-vivisectionist they are actually unwelcome, as justifying the very researches which they attack.

It is a commonplace with Mr. Coleridge and his friends that they are actuated by the highest of all motives—love and humanity. The commonplace has been so reiterated that among the public it is taken as a matter of course, and even the Lord Chief Justice

would appear to have regarded science and humanity as necessarily to be found in opposing camps. Let us see how far this claim of theirs will bear investigation.

If Mr. Coleridge and his friends were, indeed, the lovers of men and animals they declare themselves to be, no body of individuals in the kingdom would be less ready to receive or believe in stories of cruelties in others which would be incomprehensible and impossible in themselves. They would put them to the strictest tests, only accept them on the clearest proof, and rejoice unfeignedly were such proof not forthcoming.

But what really happened? A scientific man is accused of barbarities which would sicken a savage. The eye-witnesses repeatedly observe in silence tortures which a word would have ended, nay, they even withhold that word because it would have ended them, and yet Mr. Coleridge actually accepts this tale. He adopts it, he declares he has used every possible means to verify its truth, and he gives out this slander to the world, though he might easily have learned that these sufferings were inventions, and that the tortures of the defenceless creatures in whom he professed so deep an interest had never occurred at all. Is this humanity? Is this love, the love that thinketh no evil, or is it the wounded *amour propre* of one who has been worsted many times, whose statements have been refuted over and over again?

It is difficult to understand the secret of the paradoxes we are called upon to reconcile—philanthropists ascribing the basest actions to their fellow men, humanitarians diverting funds from hospitals, moralists supporting calumny by falsehood. The high motives which are claimed should exist, but until those claims rest upon some better foundation than asseverations contradicted by facts, we shall continue (and we should advise all others who are seriously considering this question to continue) to discount them altogether.

NYASALAND.¹

MR. DUFF has written a very charming and illuminative book on Nyasaland, otherwise known as the British Central Africa Protectorate, where, since the beginning of 1898, he has resided as an official. His acquaintance with the little protectorate of 43,000 square miles was mainly limited to the Shire Province and the west coast of Lake Nyasa, but Mr. Duff is made of the same stuff as the late Prof. Henry Drummond—he is able to take in many salient points at a glance and to see things which do not strike the ordinary traveller or resident. (Whatever may be thought of Henry Drummond's later writings by scientific men, no scientific man acquainted with Africa can fail to regard his little work on Central Africa as one of the most remarkable contributions to the literature of the Dark Continent which has ever been published.)

Mr. Duff's work is illustrated by a few well chosen photographs and several of his own drawings, most of which are excellent, but one or two, perhaps, too sketchy and vague to consort with the general accuracy of the book. There are useful appendices, a sketch-map of the protectorate, and a good index.

The portions of the book which will most appeal to the readers of NATURE are those dealing with the flora, fauna, and human inhabitants, and these subjects occupy more than half of the book.

"If it be spring," writes the author, "the display of flowers will attract the attention of the most indifferent, blooms of every shape and hue being then abundant, from the great clusters of petals adorning certain papilionaceous trees down to the less conspicuous but equally beautiful ground flowers and

¹ "Nyasaland under the Foreign Office." By H. L. Duff (B.C.A. Admn.) Pp. xv + 422. (London: George Bell and Sons, 1903.) Price 22s. net.